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Detrital and pedogenic magnetic mineral phases in the loess/palaesol sequence at Lingtai (Central Chinese Loess Plateau)

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Abstract

A detailed rock magnetic investigation of loess/palaeosol samples from the section at Lingtai on the central Chinese Loess Plateau (CLP) is presented. Thermal demagnetisation of isothermal remanent magnetisation (IRM) and Curie temperature measurements suggest the presence of magnetite, maghemite and hematite as remanence carrying components. Bulk and grain size fractionated samples have been analysed using coercivity spectra of remanence acquisition/demagnetisation curves, which identify four main remanence carriers in different grain size fractions of loesses and palaeosols. A linear source mixing model quantifies the contribution of the four components which have been experimentally derived as dominating endmembers in specific grain size fractions. Up to two thirds of the total IRM of the palaeosols are due to slightly oxidised pedogenic magnetite. Two detrital components dominate up to 90% of the IRM of the loess samples and are ascribed to maghemite of different oxidation degree. Detrital hematite is present in all samples and contributes up to 10% of the IRM. The iron content of the grain size fractions gives evidence that iron in pedogenically grown remanence carriers does not originate from the detrital iron oxides, but rather from iron-bearing clays and mafic silicates. The contribution of pedogenic magnetite to the bulk IRM increases with the increasing degree of pedogenesis, which depends in turn on climate change.

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Keywords

China, Component analysis, Loess, Palaeosol, Rock magnetism